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Status of the Giant Helleborine, *Epipactis gigantea* (Orchidaceae), in Canada*

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The Giant Helleborine, *Epipactis gigantea*, is known in Canada from 12 sites in southern British Columbia, the earliest of which was discovered in 1877. It grows in open, wet sites adjacent to mineral springs (including hot springs) on calcareous, porous substrates. Most of the Canadian stations are known from single records and only four have been seen since 1965. The largest known extant station, at Fairmont Hot Springs, has declined in recent years and is vulnerable to further site disturbance. *Epipactis gigantea* is threatened in Canada.

Key Words: *Epipactis gigantea*, Giant Helleborine, British Columbia, threatened, distribution, population size.

The Giant Helleborine, *Epipactis gigantea* Douglas ex Hooker, is a member of a small genus of about 20 species of the temperate regions of Eurasia and North America (Luer 1975). It is one of only two North American species, the other being the introduced *E. helleborine*, the Helleborine, of Europe that has become a widespread "weed" in northeastern North America and in southwestern British Columbia (Scoggan 1978; Brunton 1986a). There is no evidence of *E. gigantea* spreading in the aggressive manner of *E. helleborine* although it has been successfully transplanted from the wild into gardens in Canada. It is not known to have medicinal or economic uses.

Epipactis gigantea is a leafy, erect orchid, standing 20–70 cm tall and with 3–5 showy flowers aligned along one side of the upper stem. The flowers are coppery-green in colour, with sepals and petals striped with brown and brownish-purple. Each flower has a prominently raised sac that is distinctly marked with thin purple streaks (Figure 1). The plant is found growing in both small and large groups, usually occurring in dense stands (Figure 2).

Distribution

Epipactis gigantea extends from central Mexico northward throughout the western United States and into southern British Columbia. Its range is completely within cordilleran areas of the continent (Figure 3; see the COSEWIC report for detailed references to this map). It was first collected in Canada along the international border at Osoyoos, British Columbia, by George Dawson on 18 June 1877 (Macoun 1890). By 1900, two other stations, now extirpated, had been found in Canada. Additional stations were occasionally discovered thereafter. None of these are located north of Shuswap Lake (ca. 51°N latitude) and only one old station is known within 200 km of the Pacific Ocean. Most stations are found in the dry interior of southern British Columbia (Figure 3).

FIGURE 1. Flower of *Epipactis gigantea*; note the Snout Beetle (Curculionidae) on the back of the flower (22 July 1982, Fairmont Hot Springs, British Columbia).

*Based on a COSEWIC status report by the author. Copies of the complete report are available at cost from the Canadian Nature Federation, Suite 203, 75 Albert Street, Ottawa K1P 6G1. Threatened status was approved and assigned by COSEWIC on 4 April 1984.

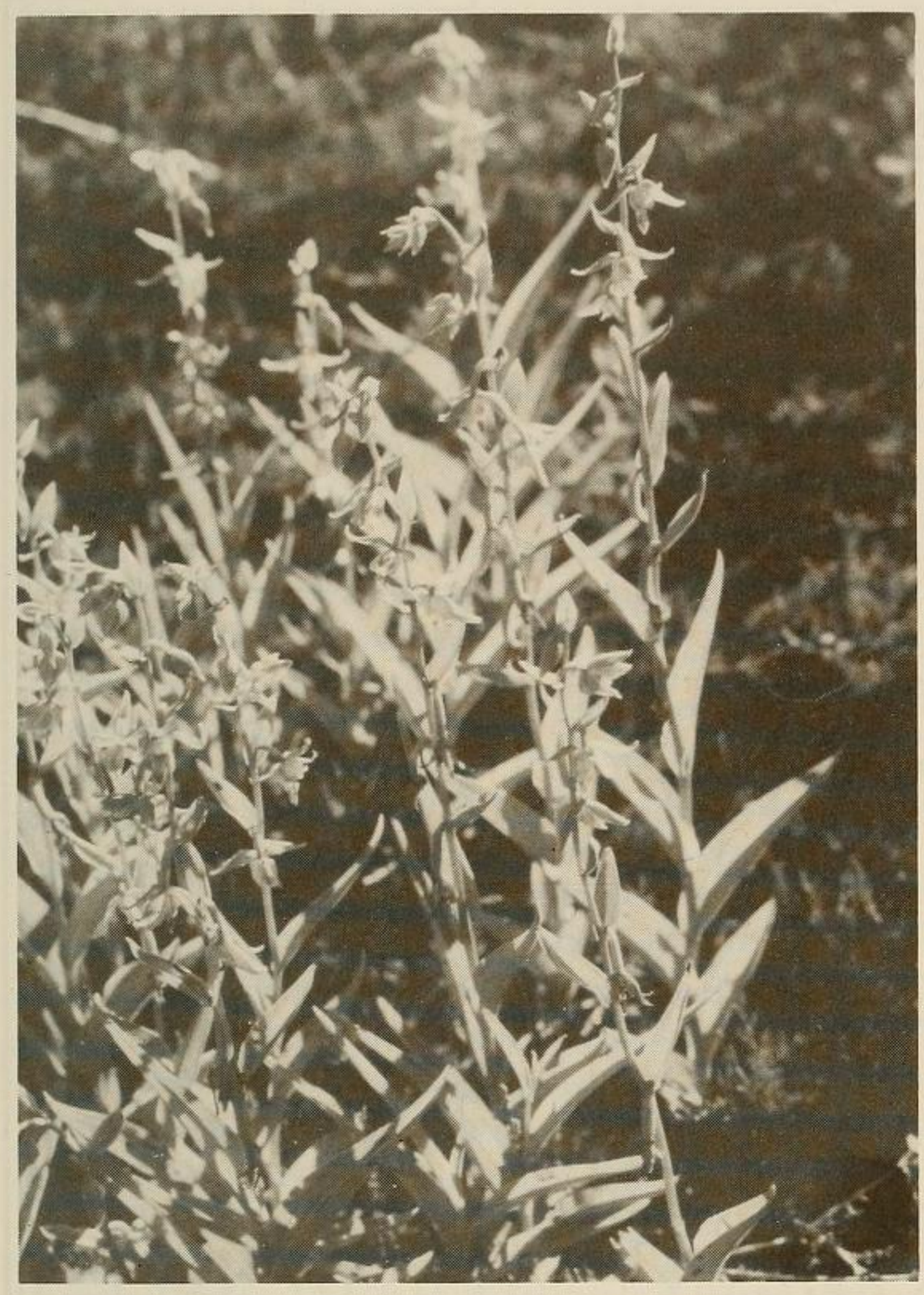

FIGURE 2. Dense cluster of *Epipactis gigantea* (22 July 1982, Fairmont Hot Springs, British Columbia).

Habitat

Epipactis gigantea grows locally on open, sunny seepage slopes and rocky stream banks. In the northern portion of its range, it prefers the margins of hot springs (Luer 1975). The Canadian stations all appear to be in protected sites at the edge of running water. The largest known Canadian station is found along the margins of hot spring runnels. The substrate at Canadian sites is calcareous, and is often composed of porous, exposed tufa or limestone bedrock.

General Biology

This species is usually found growing in thin, partially decomposed, wet, organic substrate. It is rarely reported in forested sites, being a species of open, early successional habitats. It can colonize suitable habitats quickly; a large stand at Fairmont Hot Springs, for example, has spread across a mat of Creeping Juniper (*Juniperus horizontalis*) that had overgrown recent human artifacts, such as glass bottles.

Epipactis gigantea reproduces from microscopically small, aerially dispersed seed. It also reproduces vegetatively from shoots off the rhizome. There is evidence for both reproductive means at Fairmont Hot Springs. The mechanism for pollination of *E. gigantea* are not clearly understood, though Luer (1975) states that pollination is by syrphid flies. I observed a small Snout Beetle (Curculionidae) crawling in and around a particular flower for several minutes (Figure 1) but I did not observe it on the pollinia. Autogamy is known in *E. helleborine*, by rotation of the pollinia against the stigmatic surface and by pollen grains falling on to the stigma (Catling 1983). It is not known for *E. gigantea*.

This species is a perennial herb in which the above-ground parts completely wither each fall. Because only a few flowers bloom at one time along the flower spike, *E. gigantea* has a long blooming period, extending (in British Columbia) from at least mid-June until mid-August. Peak flowering appears to be in mid-July.

Population size and trends

Twelve locations for *E. gigantea* are known in southern British Columbia, all within 300 km of the United States border. Three sites (Radium Hot Springs, the Arrow Lakes and north of Kootenay Lake) have been destroyed by development. Two others (Osoyoos [1877] and Ainsworth [1890]) have not been observed for many years (despite subsequent studies in these areas) and are probably extirpated. The station at Cultus Lake, Chilliwack, was known throughout the 1920s and into the 1930s. It has not been documented since and is probably gone as well. Of the remaining six stations, those at Agate Bay on Lake Okanagan, at Enderby and at Boswell, have not been recorded for at least 30 years; their status is uncertain.

Four stations are known from post-1965 collections. They are at Naramata, at Sicamous, at Celista on Shuswap Lake and at Fairmont Hot Springs. *Epipactis* has been known at Fairmont Hot Springs since 1922, although the sites at this location where collections were made prior to 1970 have been destroyed by development. The size of the populations at the other modern stations is unknown, but at Fairmont Hot Springs, over 230 plants were observed in July 1982. All were on one open tufa slope.

Only a small number of *Epipactis* sites have been known at any one time in Canada. Most stations (nine of the twelve) are known only from single records. The largest site, at Fairmont Hot Springs, has been reduced by resort expansion, and the remaining plants are threatened by the diversion of the hot mineral water in which they are growing and by possible further development.

The widespread distribution of stations suggest that

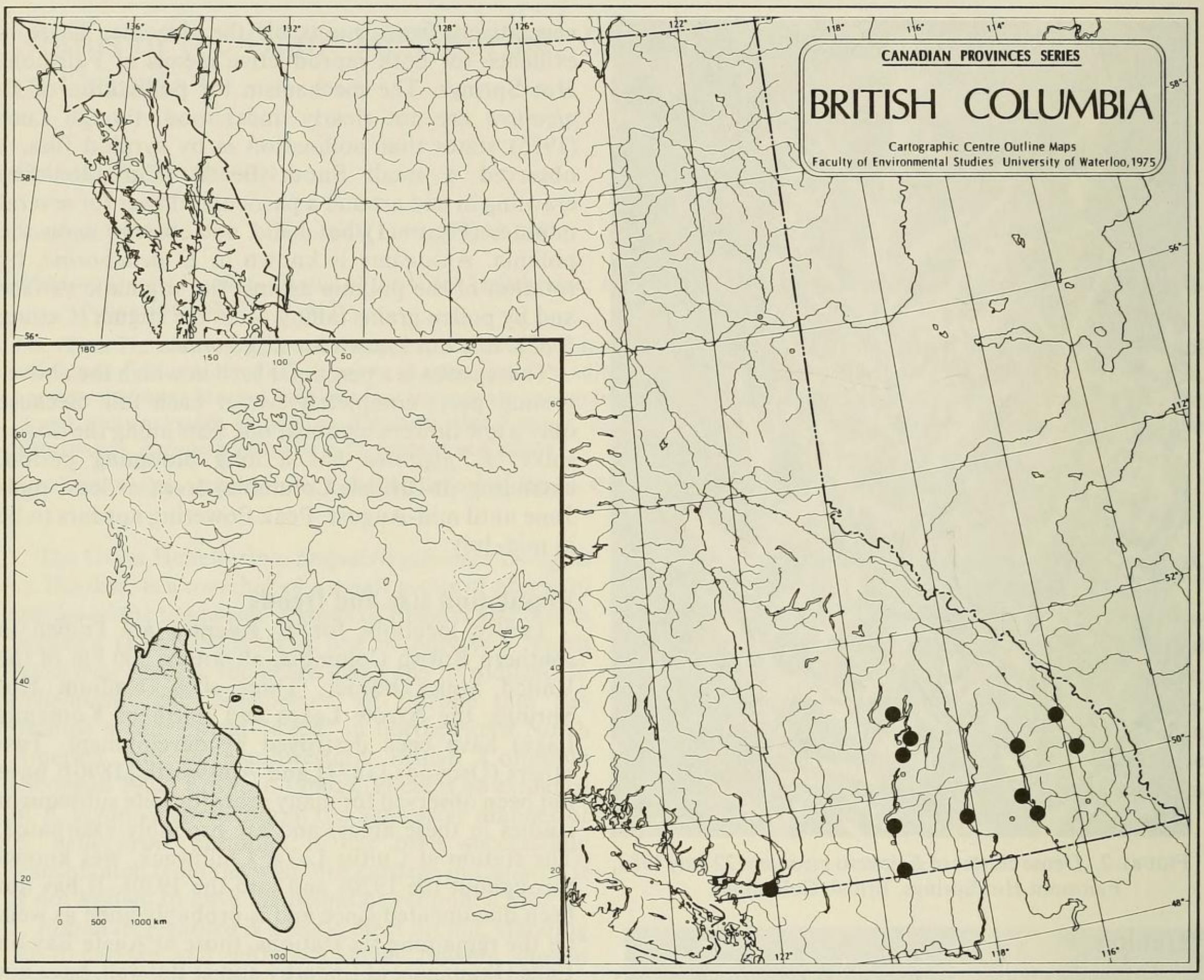

FIGURE 3. Distribution of *Epipactis gigantea* in British Columbia and North America (insert).

others may be found within the Canadian range of *E. gigantea*. An examination of the many hot spring sites in British Columbia (McDonald et al. 1981) would be a likely first step in any such search. At present, however, the known population of *E. gigantea* is small and declining in Canada.

Limiting Factors

The existence of a continuing supply of hot mineral water appears to be important to the large Fairmont Hot Springs population, as no plants were found there away from open hot spring sources. Its apparent ability to grow in sizeable numbers only in open, spring-fed, calcareous sites with little associated vegetation may indicate a poor competitive capacity.

Physical developments, such as hydro-electric dams, agriculture, and resort expansion, have destroyed a number of stations in the past and remain a threat to the scattered, localized stands of *E. gigantea* that are known today.

The effects of insect predation and disease on this species are unknown. Whereas transplantation of plants into gardens could be a serious threat to Canadian populations, to date it has only been documented at Cultus Lake (where *Epipactis gigantea* apparently no longer grows). The collection of botanical voucher specimens (maintained in the VIC, UBC, DAO, CAN, UAC and DFB herbaria — acronyms of Boivin 1980) does not appear to have had a significant impact on Canadian stations, although the potential for serious damage is present.

Special Significance of the Species

Epipactis gigantea is the only native member of its genus in Canada and the United States. Studies of its particular habitat requirements may provide insight

into the distributional limitations of this species and some of the other significant taxa with which it grows (e.g. *Panicum thermale, Adiantum capillus-veneris*: Brunton 1986b; Scoggan 1978). The pollination mechanisms utilized by *Epipactis gigantea* are unknown and could offer worthwhile topics for pollination biology research.

Protection

Epipactis gigantea is protected from international trade under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Argus 1978). It is listed as Rare (R-4, restricted distribution, large populations) in British Columbia (Straley et al. 1985) and Rare in Colorado (Weber and Johnson 1976). It is described as a *Sensitive* species in Washington (not *Threatened* or *Endangered*; Anonymous 1981). None of these provincial or state designations provide any protection for the species or its critical habitat, however.

Evaluation of Status

Epipactis gigantea is considered to be threatened in Canada because it has been recorded only in a small number of locations, most of which have not been seen for many years. Only one of our modern stations is known from more than a single record. This station, at Fairmont Hot Springs, has declined significantly in recent years and is threatened by adjacent development activities. Unless new stations are found and/or the critical habitat at the few known stations can be maintained, *Epipactis gigantea* may become endangered in Canada.

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Literature Cited

Anonymous. 1981. An illustrated guide to the endangered, threatened and sensitive vascular plants of Washington. Washington Natural Heritage Program, Olympia. 328 pp.

Argus, G. W. 1978. List of Canadian flora affected by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Canadian Wildlife Service, CITES Report 4, Ottawa.

Boivin, B. 1980. Survey of Canadian Herbaria. Provancheria 10, Université Laval, Quebéc. 187 pp.

Brunton, D. F. 1986a. The Helleborine, *Epipactis helleborine* (Orchidaceae) in Northern Ontario. Canadian Field-Naturalist 100(1): 127–130.

Brunton, D. F. 1986b. Status of the Southern Maidenhair Fern, *Adiantum capillus-veneris* (Adiantaceae), in Canada. Canadian Field-Naturalist 100(3): 406–410.

Catling, P. M. 1983. Autogamy in eastern Canadian Orchidaceae : a review of current knowledge and some new observations. Le Naturaliste canadien 110: 37–53.

Luer, C. A. 1975. The native orchids of the United States and Canada excluding Florida. New York Botanical Garden, New York. 362 pp.

Macoun, J. 1890. Catalogue of Canadian plants, [Part 5 — Acrogens, pp. 249–487]. Dawson Brothers, Montreal.

McDonald, J., D. Pollack, and **B. MacDermot.** 1981. Hotsprings of western Canada. Revised edition. Labrador Tea Company, Vancouver. 162 pp.

Scoggan, H. J. 1978. The flora of Canada, Part 2 — Pteridophyta, Gymnospermae and Monocotyledoneae. National Museum of Natural Sciences, Publications in Botany 7 (2).

Straley, G. B., R. L. Taylor, and **G. W. Douglas.** 1985. The rare vascular plants of British Columbia. Syllogeus 59, National Museum of Natural Sciences, National Museums of Canada, Ottawa.

Weber, W. I., and **B. C. Johnson.** 1976. Natural history inventory of Colorado. I. Vascular plants, lichens and bryophytes. University of Colorado, Boulder. 206 pp.

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